JPRS-CEN-88-008
2 SEPTEMBER 1988

FOREIGN BROADCAST INFORMATION SERVICE

JPRS Report

Science & Technology

China: Energy

JPRS-CEN-88-008

2 SEPTEMBER 1988

SCIENCE & TECHNOLOGY

CHINA: ENERGY

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Suggested Energy Development Alternatives For Coastal China

40130089a Beijing JINGJI RIBAO in Chinese 17 May 88 p 3

[Article by Energy Economics Study Group, Engineering Physics Department, Qinghua University: "Energy Problems in Carrying Out the Coastal Development Strategy and How to Deal With Them"]

[Text] The coastal region economic development strategy concept will certainly accelerate the development of all areas along the coast, and ultimately spark economic development throughout the entire country. However, carrying out this development strategy still requires study and solution of some problems that are in urgent need of a solution. The energy problem addressed in this article is one such problem.

There are 11 provinces, autonomous regions, and municipalities under direct central government control extending several thousand kilometers from north to south along the coast of China. This area may be divided into three regions in terms of geographic location and economic development as follows: Bohai Bay Region (or Bohai Region, for short), the Yangtze River Delta Region (or Yangtze River Region, for short), and the Zhu Jiang Delta Region (or Zhu Jiang Region, for short). The Bohai Region includes Liaoning, Hebei, and Shandong provinces, plus the cities of Tianjin and Beijing. The Yangtze River Region includes Jiangsu and Zhejiang provinces, and the city of Shanghai. The Zhu Jiang Region includes Fujian and Guangdong provinces, the Guangxi-Zhuang Autonomous Region, and Hainan Province.

These 11 provinces, autonomous regions, and directly administered municipalities had an industrial output value in 1985 amounting to 60 percent of national industrial output value, an energy consumption that was 43 percent of the national total, and an electric power consumption that was 50 percent of the national total. There was little difference among the Bohai, Yangtze River, and Zhu Jiang regions in light industry as a percentage of industry in the region, being more than 50 percent in each region. There was a very great difference, however, in energy supply and electric power generation. The Bohai Region's primary energy supply is large and its thermal electric power generation holds absolute dominance. There is no great conflict between supply and demand for

energy. The Yangtze River Region's primary energy supply is small, but 92 percent of it is thermal electric power generation, showing that the region depends mostly on transportation for its energ. This puts a very great burden on the railroads. In the Zhu Jiang Region, the primary energy supply is relatively small, and approximately one-half of it is supplied by thermal electric power plants, hydroelectric power also accounting for a substantial percentage. Assuming that the coastal region will maintain an average 12 percent industrial rate of growth between 1985 and 2000, taking the 1985 energy consumption per unit of industrial output value as a datum, and assuming a two to six percent annual rate of energy conservation by the various regions, the energy shortage for the Bohai Region, the Yangtze River Region, and the Zhu Jiang Region will be 143 million, 162 million and 115 million tons of standard coal by the year 2000. The coastal region's total energy shortage will amount to 378 billion kilowatt-hours. This energy shortage and electricity shortage will amount to 28 percent and 32 percent respectively of total energy output and total electricity output in 2000. In order to have a single yardstick for comparison of the extent of energy and electric power shortages in the three coastal regions, we used the energy shortage and the electric power shortage per unit of output value as an assessment criterion. In 2000, the energy shortage per unit of output value in the Bohai, Yangtze River, and Zhu Jiang regions will be respectively 0.81, 1.01, and 1.56 tons of standard coal per 10,000 yuan of output value. The shortage of electric power per unit of output value will respectively be 0.53, 1.06, and 1.54 kilowatt-hours per 10,000 yuan. These data show the shortage of energy and of electric power to be most serious in the Zhu Jiang Region, followed by the Yangtze River Region. The Bohai Region is somewhat better off. The above situation suggests that future economic development of the coastal region will come up against energy problems in varying degrees, and the speed with which these problems are solved will greatly affect implementation of the coastal development strategy.

Since the situation in economic and energy development differs in the various coastal regions, policies for energy development to implement the coastal development strategy in the three different regions should also differ. The Bohai Region will have to depend mostly on the burning of coal and theremal electric power. The Bohai Region is fairly close to the country's coal producing region, meaning that hauling distances are short. This region alreay has a fairly large energy output as well. Consequently, this region should adopt policies to increase energy production and lower energy consumption to achieve energy self-sufficiency. The Yangtze River Region has a well-developed industrial base, but it has very few sources of energy; it is fairly far away from energy bases; and railroad transportation is in short supply. This region's energy system has had to exchange goods for energy on the international market. For this reason, both ends of this region's production process -- import of raw materials and export of finished products -- lie abroad, including a portion of its energy to make up for the shortage of supply. Possibly some people might object saying that in a situation in which all the countries of the world are striving to reduce their dependence on the world's energy market, does it make sense

for China to go in for energy imports? We maintain that China's energy imports amount to only a small part of the country's total energy consumption, and are different in nature from some countries reliance on imports for an overwhelming majority of their needs. China's energy system has to break out of the confines of self-sufficiency. The Yangtze River region is severely short of electricity, and the pressure on coal transportation is very great. Therefore, this region should devote attention to the development of a certain amount of nuclear power plants. Electric power from nuclear power plants in Japan, Taiwan, and South Korea accounted for 24.7, 43.8, and 43.6 percent respectively of their total electric power generation in 1986. The United States, France, Japan, the USSR, and industrially developed European countries have accumulated much successful experience in the development of nuclear electric power. Therefore, development of a certain amount of nuclear electric power is possible. The Zhu Jiang Region does not have abundant sources of energy, its industrial foundation is fairly weak, and transportation is not very well developed; nevertheless, its economy has grown fastest, and its energy shortage is the most severe. Except for a portion from inside China, this region depends on imports for a substantial amount of its energy. It imports and exports much. In view of the character of this region, solution to its severe shortage of electric power lies in a policy that combines the development of water power, steam power, and nuclear power, giving nuclear power an important place.

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Conservation Effort Disappointing, Supply Outlook Pessimistic

40130107a Beijing XINHUA Domestic Service in Chinese 1135 GMT 10 Aug 88

[Article by reporter Wu Shishen]

[Text] Beijing, 10 Aug (XINHUA)--Statistics published today by the State Statistics Bureau show that the energy supply situation is characterized by "double differential"--that is, the growth of industrial output value exceeds the increase in energy consumption, with energy consumption growing faster than energy production. This indicates that despite the progress made in conserving energy, the outlook on energy supply and demand is not promising.

According to the statistics, energy consumed during the first half of this year by industrial enterprises at and above the county level was 9.6 percent more than that period last year, while their total industrial output value grew by 15.2 percent. Industrial departments' energy conservation was rated at 4.8 percent, the equivalent of 12.5 million metric tons of standard coal.

It is reported that the overall situation is that energy conservation has developed faster in those areas where energy is in short supply, while progress is somewhat slow where supplies are relatively abundant. In the first half of this year, energy consumption for every 10,000 yuan of industrial production declined in 25 provinces, municipalities, and autonomous regions. In Beijing, Hebei, Jilin, Jiangsu, Zhejiang, Anhui, and Hubei, the rate of energy conservation is higher than the national average.

Meanwhile, the industrial structure is becoming more energy-efficient. Statistics covering some 1,200 major energy consumers show that during the first half of this year they saved the equivalent of 4.57 million metric tons of standard coal, accounting for about one-third of the energy conservation nationwide.

In spite of the above, supply and demand are still strained. During the first half of this year, energy production grew only 4.6 percent nationwide, far below the rate of increase in energy consumption by industrial enterprises. In particular, the output of coal from collieries under the state's

unified distribution plan increased only slightly, resulting in poor fulfillment of the coal distribution plan. This had an adverse effect on electricity production by some power plants. Problems of energy supply and demand are expected to be even more prominent in the latter half of this year.

A responsible person of the State Planning Commission pointed out today that the chief reason that industrial enterprises' energy conservation efforts have not produced very good results is poor management. He expressed the hope that all localities and departments will further gear up scientitic management and macro control, make a serious effort to implement the "Provisional Regulations on Energy Conservation" promulgated by the State Council, include the amount of energy consumption in the terms of enterprise-management contracts, and consider that as a factor when promoting personnel and distributing materials. He also called for great efforts in popularizing technical measures aimed at energy conservation.

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Dedicated Communications Network for Power Network Said 'Top Priority'

40130088 Nanjing DIANLI XITONG ZIDONGHUA [AUTOMATION OF ELECTRIC POWER SYSTEMS] in Chinese Vol 12 No 3, May 88 pp 3-8

[Article by Peng Chunshao [1756 3196 4801] of the Bureau of Dispatching and Communications, Ministry of Water Resources and Electric Power: "Trends and Strategies in the Development of Electric Power System Communications Networks"]

[Excerpts] Abstract

Owing to the rapid development of modern communications, computers, and automation techniques and the needs of hierarchical control for large power networks, power system communications networks are being transformed from traditional analog types into digital ones. How to construct the suitable dedicated communications network for power systems in China is a task of top priority for us.

II. China's Strategies for Network Construction

The underdevelopment of public communications in China has meant that, for nearly 50 years, electric power system communications have been mainly self-constructed according to the needs and development of power dispatching. According to statistics for the end of the Sixth 5-Year Plan, China's electric power industry had an installed generating capacity of 87.05 million kW and generated 410.7 billion kWh of power annually. It had a total length of nearly 50,000 km in 220 kV, 330 kV, and 500 kV high-tension lines which serve as the backbone for large power grids. With the exception of a few areas, China has seven large interprovincial power grids for north, east, northeast, central, northwest, southwest, and south China, and they are connected with Hong Kong, Macao, and the Democratic People's Republic of Korea. The 1,000-km-plus $\pm$500 kV DC power transmission line from Gezhouba to Shanghai will connect the central and east China grids when it goes into service in 1988. This shows that China's electric power industry has entered a new stage of high voltage, large power plants, and large power grids, and that a power grid management configuration with four-level dispatching will take shape. Calculated on the basis of the goal of achieving a quadrupling of the national economy by the year 2000, a large power grid with an installed generating capacity in excess of 200 million kW will appear on the large territory of oriental China. Assuring safe and high-quality

electric power for all of society will require a tight dispatching organization to implement management by levels for all of China's power grids. This will involve the establishment of single national dispatching for the entire nation, dispatching for the seven large regional grids, dispatching for 25 provinces, and dispatching for 200 to 300 regions which also will be connected with power allocation in thousands of cities and rural electricity dispatchers. Moreover, they gradually will adopt modern communications and automation technologies to establish a large multilayer control system based on a modernized communications network focused on electronic computer systems which is essential for guaranteeing safe and economical operation of the electric power system.

To deal with trends in the development of China's electric power industry to the year 2000 and in the development of electric power system communications throughout the world at present, our grid construction strategy should be:

Unified planning, comprehensive utilization, assuring key points, and dealing with network systems according to local conditions in all of China's dedicated electric power networks.

In view of historical and developmental processes, the main thing in electric power communications is to serve grid dispatching management and handle the corresponding administrative communications, inspection and repair communications, and all types of non-voice service communications. Thus, grid construction must focus on meeting the needs of power grid dispatching management. When the grids have grown to a national scale, the fact that the Ministry of Water Resources and Electric Power manages the two main areas of water conservancy and electric power means that it must consider the need for various types of communications services in the two large water conservancy and electric power systems. As a result, plans for dispatching communications networks at the supraprovincial level cannot be detached from overall deployments for integrated dedicated communications networks for water and power in China as a whole (communications construction in the area of water conservancy also must do the same). Only in this way can the selection of circuits and circuit capacity and the determination of various indices be coordinated for several main trunk lines and communications circuits. Otherwise, each will be doing what they think is right with the inevitable result that interconnection will be impossible. China has imported 10 digital microwave circuits in the past few years which will be outfitted with optical cable multi-circuit digital communications and time division program-controlled exchanges, making the achievement of a digital communications network for the three ministerial, grid, and provincial levels a possibility. This merely requires organization of forces for careful design, and it is expected that a 64 kb/s narrow-band integrated service digital network ISDN can be opened among the three levels by the year 2000. It will transmit telephone, data, high-speed facsimile, slow-scan television, and other services. It also is possible that the conditions may permit developing n x 64 kb/s broadband services to handle conference television.

China, however, has a vast territory and attention must be given to the widely scattered basic-level units across China like power supply bureaus, power plants, transformer stations, and so on. With the exception of a few plants and stations along trunk lines which can use digital network information resources, 80 percent must rely on analog networks. We now have a large number of electric power carrier waves. We cannot eliminate them but instead must develop them in the future. According to projections, high-tension lines at 220 kV and above in China will grow to 160,000 km by the year 2000. The total length of intermediate voltage 110 kV and 35 kV lines will be about 650,000 km, with even more low-voltage lines at 10 kV and under. Full multiplexing of electric power line communications can save considerable capital for the state and provide substantial frequency resources.

At the same time, China should make a major effort to extend inexpensive and flexible VHF mobile communications to solve long-term problems in line maintenance communications and construction communications. In addition, to deal with communications in frontier and mountainous regions, we should prepare to expand frequency division multiple access satellite ground stations gradually and use this equipment to organize a national analog communications network, for which the conditions also exist.

I feel that, in a large socialist developing nation like China, construction of a modernized dedicated electric power communications network should give attention to adopting the newest international technologies at the present time and consider the reality of China's inability to attain equipment self-sufficiency. The best way to deal with needs is to combine analog and digitial according to local conditions by establishing redundant digital/analog networks (in plains regions, for example) or combined digital/analog networks (in mountainous areas, for example).

China has unified economic management systems (ministries and commissions), enterprise management systems, and power grid dispatching management systems. This is excellent for planning dedicated communications networks. Nationally, China's power grid dispatching management systems are divided into trunk line communications networks and regional communications networks. Trunk line communications networks are composed of ministry, grid bureau, and provincial bureau communications centers and the communications trunk lines which connect them. The ministry and grid bureaus as well as a few provincial bureau communications centers have interconnection capabilities, while the remaining provincial communications centers which function as long-distance terminal bureaus have only a switching function.

Regional communications networks are composed of communications centers at the regional bureau and county bureau levels as well as the communications feeder lines which connect centers at these two levels. Both of these levels have only a switching function.

Electric power communications usually can be divided into three subsystems according to communications systems:

1. Dispatching communications subsystems

These include dispatching telephones, telemechanical channels, real-time data network channels, and so on, which form dedicated dispatching communications networks.

2. Administrative communications subsystems

These include administrative telephones, teletype, facsimile, electronic mail, economic information, and other public high-speed data switching. They form integrated public communications networks for water conservancy and electric power.

3. Mobile communications subsystems

These include line inspection and repair, accident rush repairs, line construction, and other vehicle-carried wireless telecommunications, portable line patrol locating and calling systems, indefinite period emergency and flood control communications, and so on. Most of these systems use UHF mobile stations which can automatically dial local switchboards to connect into electric power public communications networks.

Others like relay protection, remote automated facilities, line defect detection, meteorological radar, soon-to-appear environmental protection monitoring systems, and so on (all of these are being used in Japan's electric power system), can jointly use line resources in communications networks but cannot connect with switching networks. Thus, they cannot form network subsystems.

Based on the above deployment, trunk line networks organize networks having a network structure which integrates stellar structures and network structures to increase network reliability and flexibility. All of this is beneficial for high-speed digital subgroup switching networks and future ISDN group networks. A stellar structure should be used by the Ministry of Water Conservancy and Electric Power for its seven large grid bureaus and by the grid bureaus for the provincial bureaus under their jurisdiction, while neighboring grid bureaus and neighboring provincial bureaus should strive to create the conditions for direct connection to the grids. Otherwise, neighboring bureaus can be interconnected by means of centers at higher levels. A stellar network structure can be used for units under jurisdiction of cities and their higher-level organs, and, with the exception of dispatching communications subsystems, electric power systems must assure a high degree of reliability in the closed system. Other communications subsystems can consider adopting interface standards stipulated by the state for connecting with national public networks to facilitate joint use of resources and increase network flexibility and reliability (the relevant standards are now being formulated in China).

Given China's characteristics of a huge territory and scattered electric power stations, with the exception of continuing to develop electric power carrier waves over large areas, transmission equipment for primary trunk lines should focus on digital microwaves with optical cables or OPGW serving in an auxiliary role. Optical fibers and OPGW should be the focus in mountainous regions, however, with digital microwaves or scatter digital microwaves serving in an auxiliary role. Satellites can be one means of communication used in mountainous regions. Whether imported or Chinese-made products are used, attention must be given to the need for code speeds and interfaces to conform to CCITT standards.

The preiliminary idea for network monitoring, control, and management is to establish monitoring systems with different scales and functions in central-level, grid-level, and provincial-level communications centers. The main goal is assuring reliable communications network operation. Examples include channel quality inspection, analysis, statistics, and immediate warnings of breakdowns. Only then is it expanded to optimal network management. Select trial points and extend them later. Gradually achieve management by levels.

Generally, communications networks are composed of different types of transmission and switching systems. There must be specific standards for these systems themselves as well as among them before they can be matched up and work to assure transmission quality in the communications networks. While international standards for communications transmission systems in electric power systems were formulated in IEC TC57, China also should formulate several standards which conform to China's national conditions on the basis of the actual situation in our own country, such as state standards for electric power line carrier wave equipment. Of course, we also must formulate standards for China's communications networks according to the characteristics of electric power system communications networks in China.

China's electric power system communications networks have just begun using program-controlled exchanges and establishing long-distance automatic switching networks. Many problems remain to be studied, such as overall demands for communications networks, compiling programs, and technical regulations, and we also must deal with problems like connecting different models of exchanges, level matching, signal conversion, and so on. If we are unable to solve these problems, they will have definite effects on communications network construction and transmission quality.

To summarize, organizing and building digital networks is extremely complex work. They have developed very quickly in foreign countries, and the designs usually are prepared by special design companies. We lack experience in China. We should prepare soon to study these questions based on current developments in communications construction in China's electric power system. I feel that we should begin with the views of user departments and with China's national situation. The first step is to focus on equipment quality management and achieve application first. The second step is to achieve long distance automation. The third step is next to attain integrated digital networks or IDN to make solid preparations for the next step of attaining integrated service digital networks or ISDN. Scientific research departments first of all should assist user departments in digesting information and technologies for the large amount of imported equipment and assume responsibility for the appropriate topics.

Briefs

Zhenzhou 500KV Substation Completed--Following a 24-hour trial run, the Zhenzhou 500KV ultra high-tension transformer station--a major state project under the Seventh Five-Year Plan and the hub of the central China power grid--officially became operational. Located in the southern suburbs of Zhenzhou City in Henan Province, the 500KV substation project cost some 600 million yuan. The project will resolve the situation in which Pingdingshan's Yaomeng and other large-scale power plants experience bottlenecks in transmitting power to the outside, and play an important role in stimulating economic growth in the central plains area as a result of strengthening the structure of the central China grid. [Text] [40130101a Beijing RENMIN RIBAO in Chinese 5 Jul 88 p 1] /08309

Shandong Power Costs Up--In the first half of this year, the Shandong power grid generated a total of 17 billion kilowatt-hours of electricity, fulfilling the annual target by 50.3 percent. Meanwhile, the electricity generated throughout Shandong Province reached 18.5 billion kilowatt-hours, scoring a 15.8-percent increase over the corresponding period last year. However, the cost of power supply went up to 24 percent over the corresponding period last year, causing profits from power supply to drop by 9.04 percent. [Text] [40130100a Jinan Shandong Provincial Service in Mandarin 2200 GMT 17 Jul 88 SK] /08309

Qinghai 330 KV Line--After the No 3 generating unit of Longyangxia power station was commissioned, another 330,000 volt super high-voltage transmission line in Qinghai Province was put into operation on 15 July. The line, with an overall length of 179.6 kilometers on 255 towers, stretches from Longyangxia in western Qinghai to Gonghe, Huangyuan, Huangzhong, Xining, Datong and up to the (Huangjiazhai) transformer substation. [Summary] [40130100b Xining Qinghai Provincial Service in Mandarin 1400 GMT 20 Jul 88 HK] /08309

Inner Mongolia Power--Inner Mongolia Autonomous Region fulfilled its annual target for electricity production by more than one-half by mid-year. As of the end of June, the region generated more than 2.9 billion kilowatt-hours of electricity, supplied 2.615 billion kilowatt-hours of electricity for consumers, and invested 163.75 million yuan in capital construction of the power industry, showing an increase of 10.36 percent, 12.24 percent, and 150 percent, respectively, over the corresponding period last year. [Summary] [40130100c Hohhot Inner Mongolia Regional Service in Mandarin 1030 GMT 18 Jul 88 SK] /08309

Jiangsu Power Output--From January to June this year, various electric power plants in Jiangsu Province generated a total of 15.97 billion kWh of electricity, overfulfilling the state production task for the period. [Summary] [40130107b Nanjing Jiangsu Provincial Service in Mandarin 0915 GMT 21 Jul 88 OW] 07310

Macroscopic Implications of Three Gorges Presented

40130086 Hong Kong LIAOWANG in Chinese No 22, 20 May 88 pp 12-13

[Article by Gu Mainan [7357 6701 0589]: "Development of Water Conservancy Resources on the Chang Jiang Should Do the Easiest First and the Hardest Last--Professor Wang Ganchang [3769 3227 2490] Discusses Macroscopic Policymaking in the Three Gorges Project"]

[Text] A few days ago, I visited the renowned physicist Professor Wang Ganchang to discuss macroscopic policymaking for the Three Gorges project.

Wang Ganchang is a scientist noted for his meticulous scholarship. Before my visit, I phoned to talk about the reason for my visit, which enabled him to have a detailed outline for our discussion. He said:

"The Three Gorges project has attracted widespread attention from Chinese and foreign scholars because it is unprecedented in scale and complexity, not only in China but in the world as well. It involves questions of ecological equilibrium, resettlement, the state's financial capacity, the extent of economic and scientific and technical development, the advantages or disadvantages and the safety or risk to nearby regions and the entire middle and lower reaches of the Chang Jiang, effects on future generations, and so on. Shouldn't there be democratization and scientization? The correctness of policies is enormously important and cannot be taken lightly."

Eighty-one year old Wang Ganchang sat on a sofa in his home, looking over his outline with penetrating eyes, and continued: "China still is very poor and we cannot deal with the Three Gorges merely in terms of the Three Gorges. All factors must be taken into consideration, and there are many things in China, many urgent things, which require the expenditure of manpower, materials, and financial resources. The wind-blown sand problem, for instance, urgently demands study and resolution. Beijing and even the entire northern China region may be seriously endangered in the near future. Dealing with the problem of aridity in northwest China requires the planting of grass and trees, which costs money. If we do not find ways now to deal with it, the outcome will be disastrous. Money also is needed for science and education. Thus, money must

be spent in regions where it is most urgently needed." He said: "The development of water conservancy resources on the Chang Jiang should involve the easiest first and the hardest last. Water resources of its tributaries should be fully utilized first. This has the advantages of costing little and producing benefits quickly. The Chang Jiang has several hundred tributaries and we can find ways to utilize them now to solve the electric power shortage. If we begin working on the Three Gorges project now it will take 10 to 20 years to complete and consume huge amounts of capital. If we begin it while national resources do not permit, we might get nowhere, or we might have to abandon it in the middle, which is bad. History provides lessons in this area. In the Three Gorges project, for example, we are hearing only one side of the story now and failing to take all aspects into consideration. The result will be major setbacks."

During our discussion, Wang Ganchang recalled that specialists in China had done a great deal of survey research on the Three Gorges project since the nation's founding, and he considered the opinions of the experts to be very worthy of consideration. He said: "For several years, Chinese experts did a great deal of systematic survey research on the Three Gorges project and earnestly considered relevant conditions in foreign countries. Mr. Sun Yueqi [1327 6390 1505] of the Chinese People's Political Consultative Conference Standing Committee, for example, who is in his 90's, ignored his age and infirmities to read a great deal of information on the Chang Jiang basin and the Three Gorges project over the past few years and visited many experts. He spent almost 40 days with comrades from the Chang Jiang Basin Comprehensive Control and Three Gorges Project Survey Group of the Chinese People's Political Consultative Standing Committee making a personal visit to the middle and lower reaches of the Chang Jiang. Afterwards, he wrote a 10,000-word article suggesting that the Three Gorges project not be built in the near term. These opinions and suggestions are very deserving of consideration. Of course, S&T and engineering and technical personnel in the Chang Jiang Basin Planning Office and other relevant units have done much survey research and scientific research work on the Three Gorges since the nation was founded, and they obtained a great deal of data and research achievements. Still, the scale of the Three Gorges project and the difficulties involved in a multi-goal policy are unprecedented in the history of water conservancy construction in the world. We certainly cannot consider the relevant scientific research work to have been completed since many key questions await more intensive scientific experimentation and exploration. It is dangerous to consider existing conditions to be fully mature and simply wait for the idea of starting construction."

He said: "After the nation was founded, enormous waste and losses were created by building several large projects in China. The main lesson was that those responsible lacked the necessary democratic working style and scientific attitude during the policymaking process. We cannot make the same mistake in decisions about the Three Gorges project. There have been repeated injunctions for democratization and scientization of decision-making in current system reforms in China, and they should be more fully observed during the decision-making process for the Three Gorges project." At this point, he took out the

recently published book LUN SANXIA GONGCHENG DE HONGGUAN JUECE [On Macroscopic Policymaking in the Three Gorges Project] and said: "This book discusses a great deal of effort expended by renowned Chinese and foreign experts and scholars based on full survey research. These major research achievements are very beneficial for debate and policymaking in the Three Gorges project and definitely should be read." Flipping to an article in the book, he said: "This book contains three parts. The 17 articles in the first part mainly discuss the guiding ideology for policymaking in the Three Gorges project. The experts feel that, although the Three Gorges project is a comprehensive key project for the Chang Jiang basin, it still is only one of many projects for the Chang Jiang basin. This project is located in the key part of the middle and lower reaches of the Chang Jiang, a densely populated and industrially and agriculturally developed region of China, and involves an especially huge interregional, multidepartmental, and multisectoral project. As a result, the decision to build it cannot be based on the partial needs of one region, one sector, or one period, or by simply seeing the Three Gorges solely in terms of the Three Gorges. Instead, we should start with the overall interests of the nation, the people, and the long term. We should hold scientific debates not only from the perspective of the Three Gorges project itself, from the perspective of science and technology in areas like hydrology, silt, waterlogging, resettlement, earthquakes, geology, ecology, hydraulic engineering, mechanical and electrical equipment, and so on, or from the perspective of comprehensive benefits like power generation, flood prevention, shipping, and so on. We also must have systematic and full scientific debate on comprehensive control and development of the entire Chang Jiang basin, policies for our overall national deployment of energy resources, national economic and social development strategies, and so on. The second part contains 19 articles which mainly discuss various special topics in development of the Chang Jiang. The third part contains 14 articles which mainly discuss the need to use the perspective of China's macroscopic energy resource policies, including coal, hydropower, thermal power, nuclear power, and the rich hydropower resources along the many large rivers in China, to view the development of hydropower in the Three Gorges in terms of its status and role in China's energy development strategies. They feel that there is an extreme shortage of electric power now and that China's financial resources are limited. Given the loss of equilibrium between total supply and total demand, we should adopt the construction principle of short schedules, small investments, and quick results to ensure stability and unity of the national economy and society. They point out that the schedule for the Three Gorges project is very long and that large investments must be expended during the construction process, but it will be useless for achieving the strategic goals of doubling the gross national product again and attaining a relatively well-off standard of living for the people by the end of this century.

Wang Ganchang said in closing that: "I strongly favor the view of Professor Zhou Peiyuan [0719 1014 3293], which is that a more realistic method which conforms to actual conditions in China is first building hydropower stations along all of the Chang Jiang's tributaries. This would enable us to attain the goal of quadrupling the gross value of industrial and agricultural output by the end of this century, and it would create the conditions for going ahead with the Three Gorges project. In a few decades, when the state's financial resources are stronger and scientific and technical levels have improved, only then will there be reliable guarantees for construction of the Three Gorges project."

Experts Suggest Forming Corporation To Exploit Lancang Jiang Hydropower

40130098a Beijing GUANGMING RIBAO in Chinese 20 Jun 88 p 2

[Article by reporter Zhou Yanmei [0719 3601 2734]: "Over 40 Experts in Beijing, Sichuan, and Guangdong Suggest Forming a Lancang Jiang Hydropower Development Corporation To Exploit Hydropower Resources on the Lancang Jiang"]

[Text] I recently accompanied the "Lancang Jiang Hydropower Integrated Inspection Group" composed of more than 40 experts from Beijing, Sichuan, and Guangdong on a one-month field visit to the Lancang Jiang. The Lancang Jiang has abundant natural resources, advantageous topographic and geological conditions, and ample and stable precipitation. In Yunnan Province alone, there is],240 km of river channel with a drop of 1,780 meters and a possible total installed generating capacity of 20.73 million kW with an assured output of 9.58 million kW and yearly power output of 108.8 billion kWh. The experts feel that development of these rich hydropower resources will overcome production losses caused by a long-term power shortage in Yunnan and that using hydropower can make full use of its advantages as a "plant kingdom" and "nonferrous metal kingdom." This in turn would lead to growth in industrial and agricultural production throughout Yunnan and aid its people in overcoming poverty and achieving prosperity.

There is a restrictive problem facing development of Lancang Jiang's hydropower; however, where will the capital construction funds come from? Without construction funds, development of Lancang Jiang's resources is merely empty talk. Of the eight cascade power stations planned for the middle and lower reaches of the Lancang Jiang, only the Manwan Power Station is under construction now. An urgent question facing us is how to continue developing the Lancang Jiang and raise several billion to several tens of billion [yuan] of capital. The experts feel that the most basic and realistic way is to establish a "Lancang Jiang Hydropower Development Corporation" to use hydropower to develop hydropower and use the benefits of hydropower to continue developing hydropower.

The corporation would be unit which builds each of the cascade power stations on the Lancang Jiang. It would be responsible for power station production and operation, and it would implement economic responsibility for its own profits and losses, meaning that it would have development rights as well as administrative rights. This is an effective measure for continued growth in capacity for

self construction and self development and for using a connected power station construction pattern to attain the goal of continuous development of the Lancang Jiang. Concretely speaking, this involves using completion and start-up of the Manwan Power Station as the foundation, paying interest while temporarily not repaying the principle, and using benefits from power it generates as capital to build the Dachaoshan Power Station. When Dachaoshan begins generating power, benefits from Manan and Dachaoshan then would be used to build the next power station.

In the area of corporation management, some experts pointed out that it should "use flexible and varied patterns and implement multidirectional management." In joint administration of mines and power plants, for example, one pattern is to use electric power as an investment input and implement profit retention. Another pattern is to use electric power as an input with retention based on products.

The famous hydropower expert and deputy inspection group leader Luo Xibei [5012 6007 0554] pointed out: "Establishing the Lancang Jiang Hydropower Development Corporation is a new route and new method in hydropower construction, and all areas should support it."

12539/08309

The Lancang Jiang Basin: Target for Major Development

40130102b Beijing RENMIN RIBAO (OVERSEAS EDITION) in Chinese 27 Jul 88 p 1

[Article: "The Lancang Jiang Basin, Richly Endowed with Natural Resources, Has Been Included Among Key State Comprehensive Development Regions"]

[Text] This reporter learned from relevant departments that the Lancang Jiang basin, which is rich in natural resources, has been included as one of 19 key comprehensive development regions in China. The curtain already has opened on comprehensive development of the Lancang Jiang basin focused on developing and building a hydropower and nonferrous metals base area.

The river section in the middle and lower reaches of the Lancang Jiang within the boundaries of Yunnan is a hydropower "motherlode" seldom seen in China. Cascade development of a total installed generating capacity in excess of 13 million kW may be possible. The three-dimensional climate within the basin is pregnant with rich organic resources and it is a state-stipulated rubber, tea, and shellac base area. The Lancang Jiang basin also is an important mineralization zone in China which contains substantial reserves of nonferrous metals, rare metals, nonmetallic ores, and so on, and it holds first place in China in lead and zinc ore reserves.

To speed up progress in building the Lancang Jiang basin economic zone, the Yunnan Provincial People's Government recently formally proposed the development principle of "hydropower first, integrating power and mining, opening up to the outside world, comprehensive development" for rapid conversion of resource advantages into economic advantages. The strategic goals for comprehensive development of the Lancang Jiang basin have already been decided: by the year 2000, shift the focus in stages to continued development of eight cascade power stations; at the same time, build a national phosphorous chemical industry base area and increase the yearly phosphorous ore production capacity to 20 million tons; build a nonferrous metals base area focused on the Lanping Lead and Zinc Mine and the East Yunnan Aluminum Plant and to build the Anning salt chemistry industry base area; build a tropical crop product base area for rubber, sugarcane, nanyao, perfume, and so on, and the Simao forest product base area. According to the information, the Manwan Hydropower Station which now has

an installed generating capacity of 1.5 million kW diverted the river 1 year ahead of schedule and is expected to begin generating power in 1991. Preparations to build a 180,000 ton-per-year phosphorous project are being speeded up and the first part of the project may go into operation in 1991.

Yunnan Provincial Governor He Zhiqiang [0735 1807 1730] announced on 26 July 1988 that the Yunnan Provincial Government has already formulated several preferential measures and stipulationsin search of domestic and foreign cooperation.

12539/9604

Canadian Feasibility Study on Three Gorges Project Completed

40100038a Beijing XINHUA in English 1227 GMT 5 Aug 88

[Text] Beijing, August 5 (XINHUA)--A Canadian feasibility draft report on China's massive proposed Three Gorges Projects has been basically completed, a senior Chinese engineer said today.

Pan Jiazheng, chief engineer of the Ministry of Energy, said the report concludes that the project is technically and socio-economically feasible.

Meanwhile, Pan said, the Chinese government has more than 400 experts in 40 specialities working on feasibility studies of the project, too.

Their studies are expected to be completed before the end of the year before the government is to make its decision about whether to go ahead with the project or not.

The Canadian consultative group (CYJV) responsible for the 2-year study recommended a normal pool level (NPL) of 160 meters, 15 meters lower than that proposed by Chinese engineers.

The NPL is the normal height of the water in the reservoir behind the dam.

The World Bank has endorsed the Canadian group's conclusions.

Pan is chairman of the steering committee organized by the Canadian and Chinese governments and the World Bank to guide the studies.

Pan, who has just returned from the committee's sixth meeting in Montreal, Canada, said the group felt the project could be justified economically for its flood control and power benefits.

The study, funded by the Canadian government, felt the resettlement of the people forced to move as the reservoir grew to a 160-meter level--a major cost component of the project--appeared to be realistic.

The study also believed that the environmental consequences of the project did not appear to be significant.

Pan said that Chinese engineers prefer the final NPL to be 175 meters and to be realized in two stages.

The higher level would permit heavier draft barges to reach Chongqing, the economic hub of southwestern China.

He said the NPL in the first stage would be 156 meters to give more time to relocate people.

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BRIEFS

Dongjiang Adds Unit to Grid--Human Province's Dongjiang hydroelectric station--a major state project under the Seventh Five-Year Plan--is already starting to produce some benefits, transmitting a strong current from deep within its mountain location to central China. At 2:00 am on 2 July, the 125,000 kilowatt No 2 unit of the station formally joined the grid. At the same time, the No 1 unit has completed a 6-month period of trial operation and was officially handed over to the state by the construction personnel. The Dongjiang hydropower station is located on the upper reaches of the Lei Shui, a tributary of the Xiang Jiang. Though designed primarily to generate electricity, it is a comprehensive project that will also provide flood control, enhance navigation, and supply a source of water for industrial development. The station has four generators for a total installed capacity of 500,000 kilowatts. [Text] [40130101b Beijing RENMIN RIBAO in Chinese 5 Jul 88 p 1] /08309

Shanghai's Shidongkou No. 2 Plant Now Operational

40130099 Shanghai City Service in Mandarin 2200 GMT 29 Jun 88

[Excerpts] China's first supercritical steam power plant--the Huaneng Shidongkou No. 2 Power Plant--was officially started up this afternoon. This project was jointly developed by the Huaneng International Power Development Corporation and the municipality of Shanghai with the approval of the State Council. Attending and addressing a ground-breaking meeting were Major of Shanghai Zhu Rongji, Vice Mayor of Shanghai Gu Zhuanxun and General Manager Wang Defang of the Huaneng International Power Development Corporation and other leading comrades. The power plant is located about 27 kilometers from the center of the city and in a plain area along the Chang Jiang. Two supercritical 600,000 kW power generators will be imported from abroad and installed during the first stage of the project with the possibility of adding two more similar generators at a later date. After its completion, it will become China's first supercritical large-capacity steam power plant. It will not only alleviate the power shortage being experienced in Shanghai and promote the city's economic developments, but also play a significant role in helping Shanghai in the manufacture of power generating equipment since the import of the supercritical power generators will also bring in advanced technology in this connection to China. It will provide an additional 20 million Kilowatt-hours of electric power, and increase the social output value by more than 100 million yuan and profits and taxes by more than 10 million yuan for the state when it goes into operation.

The Shanghai Power Development Bureau and the companies under contract to building this power plant pledged to meet the requirements in the contract, speed up their designing and construction work, and quicken their pace in supplying the building materials and equipment to ensure that the first power generator will go into operation by the end of 1990.

/12223

BRIEFS

Changxing Plant Expansion--The Changxing power plant in energy-starved northern Zhejiang Province is slated for expansion. Upon completion of the project, the plant will have a total installed capacity of 874,000 kilowatts. The first 225,000-kilowatt generator will go on stream in 1990. Today, the total installed capacity for thermal power in the entire Hangzhou-Jiaxing-Huzhou region is only 300,000 kilowatts or so and for this reason the Zhejiang Provincial Electric Power Bureau has decided to build this fairly large-scale expansion project on the site of the original plant. [Text] [40130101c Shanghai WEN HUI BAO in Chinese 16 Jun 88 p 3] /08309

Sichuan Plant Expansion--The Baima power plant in Neijiang, Sichuan Province, a major construction item of the State's Seventh Five-Year Plan and a project crucial to alleviating the power shortage in the province completed a 72-hour trial run at peak power and officially went on stream late last month. Some 5000 electric power workers toiled for 33 months to complete the 200,000-kilowatt No 1 generator of this plant expansion project. [Text] [40130105a Chengdu SICHUAN RIBAO in Chinese 5 Jul 88 p 1]

Shandong Plant Planned--Jinan (CEI)--A thermal power plant with a capacity of 200,000 kW will be built jointly by the Hong Kong China Merchants Group and Shandong Province in Weihai City, Shandong Province under an agreement signed between the two parties recently. According to the agreement, Shandong Province will invest 45 percent of the total shares and the rest will be invested by foreign-funded companies. The plant will be operated and managed in accordance with international practice. [Text] [40100038b Beijing CEI Database in English 5 Aug 88] 07310

BRIEFS

Mine Output Up--Beijing (BEI)--China's major coal mines produced more and had a better safety record in July than since the start of the year, according to the China Coal Corporation. The total coal output in July was 73.55 million tons, of which 36.8 million tons were cut by major mines. This represents an increase of 1.09 percent and 2.36 percent respectively over the same period last year. [Text] [40100038c Beijing CEI Database in English 3 Aug 88] 07310

Shanxi Discovery--Taiyuan (CEI)--A coal field covering an area of 160 square kilometers with proved reserves of 3.4 billion tons was discovered recently in Youyu County of Shanxi Province. Buried from 40 to 190 meters (generally 70-90 meters) below the earth's surface, the large new coal seam has an average thickness of 15 meters to 20 meters with four initially--verified seams. [Text] [40100038d Beijing CEI Database in English 22 Aug 88] 07310

New Fields Discovered at Mouth of Pearl River

40130102a Shanghai WEN HUI BAO in Chinese 11 Jun 88 p 1

[Article: "Several New Oil Fields Discovered at Mouth of Pearl River--They Have Become the Main Battlefield for Foreign Cooperation and Development of China's Marine Petroleum--After These New Fields Go Into Service, Their Production Capacity May Surpass 5 Million Tons in 1995"]

[Text] This reporter learned from relevant departments that several new oil fields have been disvoered in the South China Sea east of the mouth of the Pearl River in the past few years. This area of the sea will become one of China's main petroleum production base areas, and it has already become one of the main battlefields for foreign cooperation in China's marine petroleum.

The Pearl River mouth basin covers a total sea area of 175,000 km^2. Since its establishment in 1983, the East South China Sea Petroleum Company has cooperated with 27 petroleum companies in nine nations in exploring for petroleum resources. They worked for almost 5 years to complete over 58,000 km of marine seismic survey lines, drilled exploratory wells in 49 structures and 59 fixed wells, drilled more than 196,000 m, and spent about $600 million on exploration. They discovered 16 oil- and gas-bearing structures, including the large Liuhua 1 oil field with geological reserves in the 100 million-ton grade in early 1987. They also announced that the Huizhou 21-1 oil field has gone into formal development, the Xijiang 24-3 oil field will be developed, and the Lufeng 13-1 oil field now is being evaluated. Themain one is the just-discovered Huizhou 26-1 oil field, a high-output oil field with intermediate quality oil. It has simple structures, enormously thick oil strata, good material quality of reservoir strata, and good crude oil quality. Its daily single well output is the champion in daily output for single wells in China's sandstone oil pools. Experts point out that development of this oil field shows the encouraging prospects for petroleum development in this part of the sea.

New oil fields have been discovered continually and oil field development now is gradually unfolding. The Huizhou 21-1 oil field under joint United States-Chinese-Italian cooperation has formally entered the

construction stage. Planned total investments are $235 million and it will be completed and start producing in 1990. Maximum yearly output may reach 980,000 tons. Shanghai's 708 Institute was responsible for designing the living modules. The bilateral project group organized by experts in the joint Sino-American Xijiang 24-3 oil field has been authorized for the design work and will present a comprehensive design program for the oil field to the state in June 1988.

Estimates are that after the new oil fields are completed and start producing in 1990, they may attain a crude oil production capacity of more than 5 million tons in 1995. Many foreign petroleum companies in Guangzhou are now moving to the South China Sea petroleum exploration and development base area--Shekou.

12539/9604

Daqing Oil Field Benefits From Price Reform

40100034a Beijing XINHUA in English 1444 GMT 15 Jul 88

[Text] Beijing, July 15 (XINHUA)--The Daqing oil field will produce 53 million tons of crude oil and turn over 4 billion yuan (1.1 billion U.S. dollars) in profits and taxes to the state this year after adjusting the price of crude oil.

Listed as an enterprise running in the red, the oil field has greatly improved its performance since the price adjustment, today's ECONOMIC DAILY reported.

According to the paper, the oil field's turn-aroundhas shown price reform was important to state-owned enterprises, and these new policies have motivated the firm's 200,000 employees.

Daqing workers plan to transform the oil field from a single petroleum production operation into multi-function petroleum products manufacturer, the paper said.

Crude oil prices at Daqing oil field have remained unchanged since the 1960s, the paper explained, but oil fields opening up and drops in recoverable reserves have caused declines in productivity and higher production costs, which have made prices inconsistent with the law of value.

For example, production costs for Daqing's sixth oil production crew doubled from 1980 to 1987, while output value increased to 2.4 billion yuan (649 million U.S. dollars) and profits dropped to 400 million yuan (108 million U.S. dollars), and according to the paper, this greatly hampered worker initiative.

The paper also said, "If price reform isn't carried out in state-owned enterprise, the talk of bringing China's economy to life will only be empty words and increased revenue will not be possible."

As of the end of last year, the Daqing oil field had produced 900 million tons of crude oil since production started in the 60s. The field also turned out 81 million tons of petrochemical products during the same period, and turned over 81.9 billion yuan (22.1 billion U.S. dollars) to the state, a figure 22 times the oil field's total initial investment.

/08309

Plans To Develop Gas Field Off Hainan

40100034b Beijing CHINA DAILY in English 16 Jul 88 p 1

[Text] China National Offshore Oil Corporation (CNOOC) and ARCO China Inc. have agreed in principle to jointly develop the Yacheng 13-1 Gas Field south of Hainan Island, the second largest island in the country next to Taiwan.

Part will be used to make liquefied gas, the remaining gas will be used on Hainan Island and possibly by other southern provinces. A preliminary feasibility study for the liquefied gas project is underway.

CNOOC and ARCO are to drill one or two exploratory wells in addition.

CNOOC and ARCO China Inc., a subsidiary of Los Angeles-based ARCO with a 34 per cent interest in the development, agreed that the project is commercial and that a final agreement is expected to be signed in Beijing in November.

The output of natural gas in the Yacheng field is expected to reach 500 million cubic feet every day. A subsea pipeline will transport the gas to the south coast of Hainan Island.

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Hainan Gas Field Project Gets Go-Ahead

40100034c Beijing CEI Database in English 18 Jul 88

[Text] Beijing (CEI)--China national offshore oil corporation has agreed in principle to jointly develop the Yacheng 13-1 gas field south of Hainan Island with Atlantic Richfield Company, Arco China Inc.

Zhong Yiming, president of China National Offshore Oil Corporation and Lodwrick Cook, chairman of the board of Arco China Inc. disclosed on July 15 that the agreement will be signed formally in November.

The Yacheng field, discovered by Arco China Inc. in 1983, is expected to produce 500 million cubic feet of natural gas a day.

The two partners are expected to drill one or two exploratory wells to determine additional gas reserves.

Arco China Inc., a subsidiary of Los Angeles-based Arco will have 34 percent interest in the gas oil field development project while the other co-venturer, Kuwait Foreign Petroleum Exploration Company, will have 15 percent interest through its subsidiary, Santa Fe Minerals (ASIA), Inc.

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BRIEFS

New Henan Reserves Found--Recently, within a 1,400-square-kilometer zone in Lankao County, Henan Province, deposits of some 60 million tons of oil and 7 billion cubic meters of natural gas have been discovered. Today, more than 30 wells are pumping oil and an infrastructure is being established that will have an annual production of 450,000 tons of crude. [Text] [40130101d Shanghai WEN HUI BAO in Chinese 7 May 88 p 3] /08309

Huabei Output Up--By the end of June, the Huabei oil field in Hebei Province had produced 3,157,328 tons of crude oil, fulfilling the annual production target by 52.19 percent. In the first half of this year, the oil field completed and put into operation 87 new wells, increasing its daily capacity by 1,600 tons. [Excerpts] [40130107c Shijiazhuang HEBEI RIBAO in Chinese 12 Jul 88 p 1 SK] 07310

Tarim Basin Find--Urumqi (CEI)--Another high yielding industrial oil-gas flow area has been found in the north of the Tarim Basin in Xinjiang Uygur Autonomous Region. The newly located area has abundant oil and gas. Since the first well was sunk in September 1984, more than 20,000 kilometers of seismic testing cross-sections have been completed and 10 test wells sunk in the region. [Text] [40100038e Beijing CEI Database in English 22 Aug 88] 07310

Role of Nuclear Power Downplayed

40130089b Beijing RENMIN RIBAO (OVERSEAS EDITION) in Chinese 10 Feb 88 p 2

[Article by Zhai Yongping [5049 3057 1627] and Ji Hua [0679 5478]: "Discussing China's Nuclear Energy Development"]

[Text] An article written by Mr Guo Xingju [6753 2502 3255] that appeared in the 1 December 1987 issue of RENMIN RIBAO (OVERSEAS EDITION), and that had been reprinted from KEXUE BAO [SCIENCE NEWS] said that nuclear energy will become China's main source of energy after 2040. As graduate students in the field of energy economics, we feel a need to express some views about the prospects for the development of nuclear energy in China.

In comparison with conventional sources of energy such as petroleum and coal, the peacetime use of nuclear energy is a new source of energy that has come into being during the past 30-odd years. In reviewing the successful and unsuccessful experiences in the world's development of nuclear energy during these 30-odd years, we have concluded that the development of nuclear energy requires a certain objective environment and certain necessary conditions.

First of all, only a country or region that lacks conventional energy sources and that can count on a supply of uranium ore should consider making nuclear energy its main energy source. This is the required objective environment for the development of nuclear energy. Considered in terms of economic, technological, and even political and social factors, if abundant conventional energy resources are not yet being used to the full, priority consideration should be given to the development of conventional energy courses. Nuclear energy is, at best, a limited supplementary source of energy.

Second, the nuclear industry is a technology intensive industry. The process from the mining of uranium ore, to enrichment, to the building of nuclear power stations, their operation, and the processing of nuclear waste is a complex and highly technical one. For any given country, systematic mastery (at least of the most important parts) of this whole

technology is also necessary for development of nuclear energy. If a country mindlessly devotes major efforts to the development of nuclear energy without regard for the level of its technological development, that is tantamount to trading its energy dependence (i.e., energy imports) for technological dependence (i.e., the importation of nuclear power station technology and equipment), and this will likewise adversely affect the national economy.

Third, as power plants responsible for satisfying basic load requirements (operating year in and year out), the cost of nuclear power should be lower that the cost of electricity generated by competing conventional energy sources. However, it should be noted that nuclear power is not necessarily feasible just because it is economical. Since the nuclear industry is also a capital-intensive industry, start-up costs are high and the capital recovery period is fairly long. Thus, the size of nuclear power construction is limited by a country's investment capabilities. But even if a country's economic strength allows large scale development of nuclear power, the squeeze effect resulting from investment in nuclear energy has to be taken into consideration. By this is meant, the objective economic effect of a reduction of investment in other fields resulting from the large investment in nuclear power stations.

Furthermore, nuclear energy differs from other new sources of energy such as solar energy. It does not disperse energy production, but rather highly concentrates energy production in order to satisfy energy requirements at various different levels. Such a concentrated energy pattern also inevitably requires unified and centralized policies and leadership, and this is another major condition for the development of nuclear power.

Since the 1980's, the world's nuclear power industries have encountered a severe crisis. Numerous developed countries, as well as some developing countries, have reduced the scale of their construction of nuclear power plants. The reason is that to a very large extent some countries do not possess, or do not fully possess these conditions, so nuclear energy cannot be developed or cannot be fully developed. Conversely, France's nuclear development strategy rests on a foundation of thorough analysis of the country's circumstances, and nuclear energy in France has seen world renowned development by leaps and bounds there. As of January 1987, France was operating a total of 49 nuclear power plants having a total installed capacity of 469.8 million kilowatts. In 1986, electric power output reached 254.2 billion kilowatt-hours, or 70 percent of total electric power generation for the same year. This was 28 percent of the total amount of primary energy consumed.

Let us now take a look at the situation in China. China's nuclear industry has a considerable foundation after many years of development. It is now able to design and manufacture medium-size nuclear power stations (300,000 kilowatts) and it has an assured supply of uranium ore. These are powerful factors for China's development of nuclear energy; however, we should not forget the two basic national situations discussed

below.

First, China has plentiful conventional sources of energy. Proven coal reserves stand at more than 840 billion tons. No reliable statistics exist for petroleum and natural gas, but new advances in prospecting old oil zones in the eastern part of the country, and particularly the application of new techniques (such as shallow oil layer exploitation plans), plus the discovery of new oil fields in western China and in the ocean have turned around the situation of sustained decline in "reservoir ratio" in the country's oil industry that has existed since the end of the 1970's. The outlook is optimistic. In addition, China has the most plentiful water power resources in the world: exploitable reserves of 380 million kilowatts, 90 percent of which have yet to be exploited. However, since these oil and water power resources are distributed unevenly, some of the provinces in the southeastern part of the country and some areas in the northeastern part of the country that are industrially developed and have a dense population are severely energy short. Consequently, China main sources of future energy will continue to be conventional ones (particularly coal), while it will be necessary at the same time to build some medium-size nuclear power stations as a supplement to ameliorate or solve the energy shortage in some areas.

The second basic national situation is that China is still an economically fairly backward developing country in which financial and foreign exchange reserves as well as the level of technology are very limited. Inasmuch as the design and manufacture of large nuclear power plants would require imports, we are particularly unable to carry out plans for the building of huge nuclear power stations.

For these reasons, we believe that China should pursue an active and well-founded policy with regard to the development of nuclear energy. By active is meant that we should build nuclear power stations; we cannot fail to build them. By well-founded is meant that we have to build them on a scale that is consistent with the country's circumstances and strength, relying on our own strength for the development of medium forced water reactor nuclear power stations for the most part. China's nuclear industry sector should plan for the building of forced water reactor nuclear power stations capable of generating between 10 million to 12 million kilowatts by the end of the present century. At that time, nuclear power will account for approximately five percent of total generated electric power, and less than one percent of the total initial energy consumption. We believe this scale and speed to be proper, and it should not be increased.

9432

Nuclear Power Said Answer to Nation's Long-Term Power Needs

40130091 Beijing GUANGMING RIBAO in Chinese 16 Jun 88 p 2

[Article by Dai Chuanzeng [2071 0278 2582]: "Nuclear Power Is an Important Way to Meet China's Medium and Long-Term Electricity Needs"]

[Text] Energy resources occupy a special status in the national economy because they are the foundation of economic development. Current per capita energy consumption in China is less than one-third the world average, making the development of energy resource construction an important aspect of economic construction in China. This is especially true of electric power construction since its rate of growth restricts the rate of development of China's economy.

Twelve years remain between now andthe year 2000. Electric power [output] in China must increase from the present figure of 100 million kW in installed generating capacity to more than 250 million kW. This will require an average yearly increase of 12 million kW of electric power. Major efforts to develop hydropower will reduce the proportion of coal-fired power from 80 percent to 70 percent over the next 12 years, but we still will need to increase coal-fired power by about 8.5 million kW each year. This will require an additional 25 million tons in raw coal production capacity each year. This growth rate in yearly output far exceeds the actual rate of growth in output in unified distribution coal mines.

The hydropower situation should receive another look. China has more than 300 million kW in developable resources but most are in southwest China. There has been a major development effort since the nation was founded but only about 5 percent has been utilized to date. By the end of this century, hydropower at the most will account for 20-odd percent of total power output, and the cost of developing new hydropower stations will increase with the difficulty of developing them. This will make it difficult to achieve any substantial increase in hydropower as a proportion of electric power production in the medium and long term.

For this reason, solving our medium and long-term electric power needs has become a major issue in economic construction now facing China. Because of the long schedules involved in energy construction, solutions to medium and long-term (20 to 50 years) energy questions will require clear guiding principles and policies as quickly as possible.

I feel that nuclear power will be a major source of growth in electric power in China in the medium and long term. The industrialized nations of the world as well as some developing nations and regions are developing nuclear power. Nuclear power costs 15 to 85 percent less than coal-fired power. This is due mainly to the fact that fuel costs account for less than one-fourth of operating costs for nuclear power but more than 60 percent for coal-fired power. A 1 million kW pressurized water reactor nuclear power station requires only 30 tons of uranium oxide fuel at an enrichment of about 3 percent each year, so there are no problems with transportation. Because fuel accounts for a small part of costs, the price of uranium and enrichment processing could triple and the cost of nuclear power would still be basically the same as coal-fired power. It is precisely for this reason that China's Taiwan Province and South Korea have developed nuclear power quickly over the past 10-plus years, and it now accounts for 43.6 percent and 43.8 percent, respectively, of total power output in these two regions (1987 statistics).

China now is building two nuclear power stations at Qinshan and Dayawan. Preparations for construction of the second stage at Qinshan are underway now, but nuclear power development still has not become a primary medium and long-term energy resource with comprehensive plans and unified arrangements. The nuclear power industry is characterized by long construction schedules, large investments, and the involvement of many industries. If we fail to give it full consideration soon, we will face a series of hard-to-solve concrete problems. If we fail to make plans soon, we may have difficulties later and it will be hard to make progress.

Foreign experiences show that China should work first to formulate comprehensive energy resource plans quickly, and that we should carry out feasibility debates and formulate the corresponding plans for medium and long-term nuclear power development in China. The content should include: goals and strategies for each stage, provision of manpower, finances, and materials, management systems, infrastructure, and so on.

The capital needed for nuclear power station construction can be obtained by implementing the "two abroads" policy [obtaining equipment and raw materials overseas], using bonds to concentrate idle capital, utilizing international low-interest loans, and various other channels. In India, for example, income from the sale of nuclear power will exceed yearly capital construction inputs for nuclear power (about $1 billion) starting in the 1990's. By the year 2000, income from nuclear power will surpass $2.5 billion annually and the entire investment (10 million kW) can be recovered in the early 21st century. In the overall picture, China's involvement in nuclear power likewise would provide large benefits from major efforts and small benefits from limited efforts.

To provide an excellent starting point for medium and long-term nuclear power construction in China, I propose that management of existing nuclear power station projects be strengthened to overcome current problems of an overemphasis on hardware and neglect of software, decentralized management systems, a lack of talented managers, and so on.

12539/9604

Experts Offer Views on Future Energy Trends

40130102c Beijing RENMIN RIBAO (OVERSEAS EDITION) in Chinese 28 Jul 88 p 1

[Article by Wang Xiaolin [3769 1420 2651]: "RENMIN RIBAO Overseas Edition Invites Experts from the Nuclear Industry Development Research Center To Discuss the Urgent Need for Diversification in Developing China's Energy Resources"]

[Text] Over 20 energy experts from the Nuclear Industry Development Research Center met with the Overseas Edition of RENMIN RIBAO to discuss the nuclear energy question. They called for a rapid shift in China's single energy resource structure focused on coal and major efforts to develop nuclear energy and diversify energy resource development as urgent tasks.

China's current energy shortage has become themain factor restricting development of the national economy and it has affected the intensification of reforms. The experts offered their suggestions on ways to overcome the problem and change the present energy shortage situation:

1. Extreme transportation shortages and serious environmental pollution have made it essential for China to readjust its energy resource structure which has been dominated by coal for such a long time. Given the distribution of energy resources, a future trend of energy development in China will be adapting to local conditions to utilize each area's advantages and scientifically and rationally establishing a multilayer, diversified energy resource structure.

2. The most effective and realistic ways to solve the coal and hydropower energy resource shortage in industrially and agriculturally developed regions along China's southeast coast are full utilization of nuclear energy and a major effort to develop the nuclear power industry. The advantages of nuclear energy are a large amount of energy, little pollution, good safety, and high utilization rates. China now has the technical conditions to develop nuclear power but is moving slowly.

3. According to estimates, nuclear energy will be China's main energy resource after 2040. For this reason, we must acknowledge the strategic significance of developing nuclear power, strive to eliminate the public's psychological obstructions to developing nuclear power, and assure the development and utilization of nuclear power with technology and capital. The main issue at present is to formulate scientific and stable medium and long term plans for development of the nuclear power industry in China.

The experts feel that the world is facing challenges of new technologies, and that the development and utilization of nuclear energy is a way out of the energy crisis. We can no longer "sleep on the coal heap" and miss the opportunity since we will regret it later.

12539/9604

BRIEFS

Nuclear Heat Supply Facility--The state is planning to construct in Harbin a heat supply plant consisting of 2X200,000-kilowatt low-temperature nuclear reactors. After this nuclear heating project has been completed, some 10,000,000 square meters of building space within the city can be heated, or one-fourth of the total space to be heated in the city. The crucial elements of a 5-megawatt low-temperature nuclear heat supply facility--the heat exchanger and the reactor core--which were designed by Qinghua University and trial-produced by the Harbin Boiler Works and the Harbin Steam Turbine Plant, passed certification in Harbin just a few days ago. Representatives of Qinghua Nuclear Power Technology Institute and the State Nuclear Safety Agency have checked and accepted the product. This provided the scientific basis for Harbin's manufacture of a low-temperature nuclear heating reactor. [Text] [40130101e Shanghai WEN HUI BAO in Chinese 3 Jun 88 p 1] /08309

Rural Energy Construction Sees Rapid Development

40130098b Beijing RENMIN RIBAO in Chinese 11 Jun 88 p 1

[Article by reporter Chen Manzheng [7115 3341 2973]: "Energy Construction Progressing Rapidly in China's Rural Areas--Popularizing Wood- and Coal-Saving Stoves, Utilizing Biogas and Solar Energy, Developing Wind-Powered Generators--Annual Energy Savings Equal 30 Million Tons of Standard Coal"]

[Text] There have been new developments in rural energy construction in China. The Ministry of Agriculture, Ministry of Water Resources, and Ministry of Forestry held a joint press conference on 10 June 1988 to introduce their respective achievements in rural energy construction.

At the end of 1987, China's rural areas had 83.73 million households using wood- and coal-saving stoves, and 4.63 million households who had built household biogas pits or were using solar energy. They had completed 120,000 m^2 of solar-heated buildings. They had 350,000 m^2 of solar energy water heaters, and more than 50,000 small wind-powered generators. There were 2.31 million peasant households using electric cookers, liquified petroleum gas and natural gas, and other superior household fuels. According to preliminary estimates, the amount of energy resources conserved each year is the equivalent of 30 million tons of standard coal. Environmental pollution also has been reduced.

Comrades from the Ministry of Water Resources stressed their achievements in developing 100 electrification trial counties across China. Electric power output from small scale hydropower now accounts for one-ninth of total power output in China. There are 800 counties which depend primarily on small-scale hydropower for their electricity.

The State Council decided in 1983 to build 100 rural electrification trial counties in 10 provinces (85 in the south and 15 in the north). The total installed generating capacity in these 100 counties is now 2.02 million kW and province-level inspection and approval have shown that 24 counties have attained preliminary electrification standards (the area provided with electricity is 90 percent and average annual per capita power use is 200 kW, including power used in industry and agriculture). The number of families provided with electricity increased from 60.6 percent in 1980 to 85 percent and exceeds 90 percent in 54 counties.

In their introduction, comrades from the Ministry of Forestry said that China consistently gave too little attention to the development of fuel forests in the past, which resulted in much fine timber being burned in stoves. The development of fuel forests was included in state plans during the Sixth 5-Year Plan. Fuel forests have grown to 42.23 million mu over the past 7 years and some areas have cut one or two harvests. They can provide an additional 10-plus million tons of firewood. In the past, peasants in Beijing's Miyun County often got into trouble with peasants in neighboring counties because of cutting firewood. After developing fuel forests, the peasants had no reason to worry about having wood to burn.

To display the achievements made in rural energy development and sell products, the China Rural Energy Industry Association is preparing to hold the Second National Rural Energy S&T Achievements and Products Exhibition and Sale from 10 to 30 June in the Beijing Agricultural Exhibition Hall. Premier Li Peng provided the inscription for the exhibition: "Strive to develop rural energy resources."

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Briefs

Asia's Largest Wind-Powered Generator--The largest wind-powered generator station in Asia will be completed and put into operation this year in the Sangezhuang area of Urumqi, Xinjiang. The wind-powered station will cost a total of some 19 million yuan and in its first stage will have an installed capacity of 10,000 kilowatts. [Text] [40130105b Beijing RENMIN RIBAO (OVERSEAS EDITION) in Chinese 28 Jul 88 p 1] /12223

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